PCS / VPC
91.PDP

PCS / VPC 91.PDP

Interfacing of the PCStopline, PCSbusline, and the VPC 090 Multi User Interface to the Profibus DP

Reg 5075/0597ss

Ver.: 1.00/05.97

- Operating instructions, manuals and software are copyrighted. All rights are reserved. Copying, duplicating and translating in whole or in part is not forbidden. An exception is valid for the making of a backup copy of the software for your own use.
- This manual describes our PCS Profibus-DP coupling We reserve the right to make changes to the manual at any time without prior notice.
- We cannot guarantee the accuracy of programs and data stored on floppy disk nor their error-free condition. We only guarantee that programs are executable within the application described in the manual.
- Since floppy disks are data carriers which can be manipulated we can only guarantee that they are physically undamaged. The liability is limited to supplying a replacement.
- We assume no responsibility for misprints. Liability is limited to damages where the misinformation is shown to be intentional.
- We always gladly welcome any ideas on improvements as well as notes on faults.
- The agreements are valid also for the special appendices to this manual.

EDITION
MAY
1997

Ideograms and symbols

The following symbols and ideograms are used in this manual:

Warning!
Possibly dangerous situation that can cause death and most serious injuries.

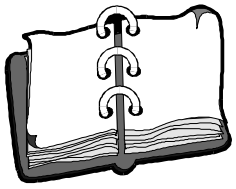
Caution!
Possibly dangerous situation that can cause light and less serious injuries.

Attention!
Possibly harmful situation that can cause damage to the product or its environment.

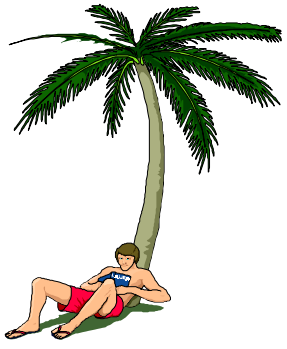
Information and notes that are additionally to be observed

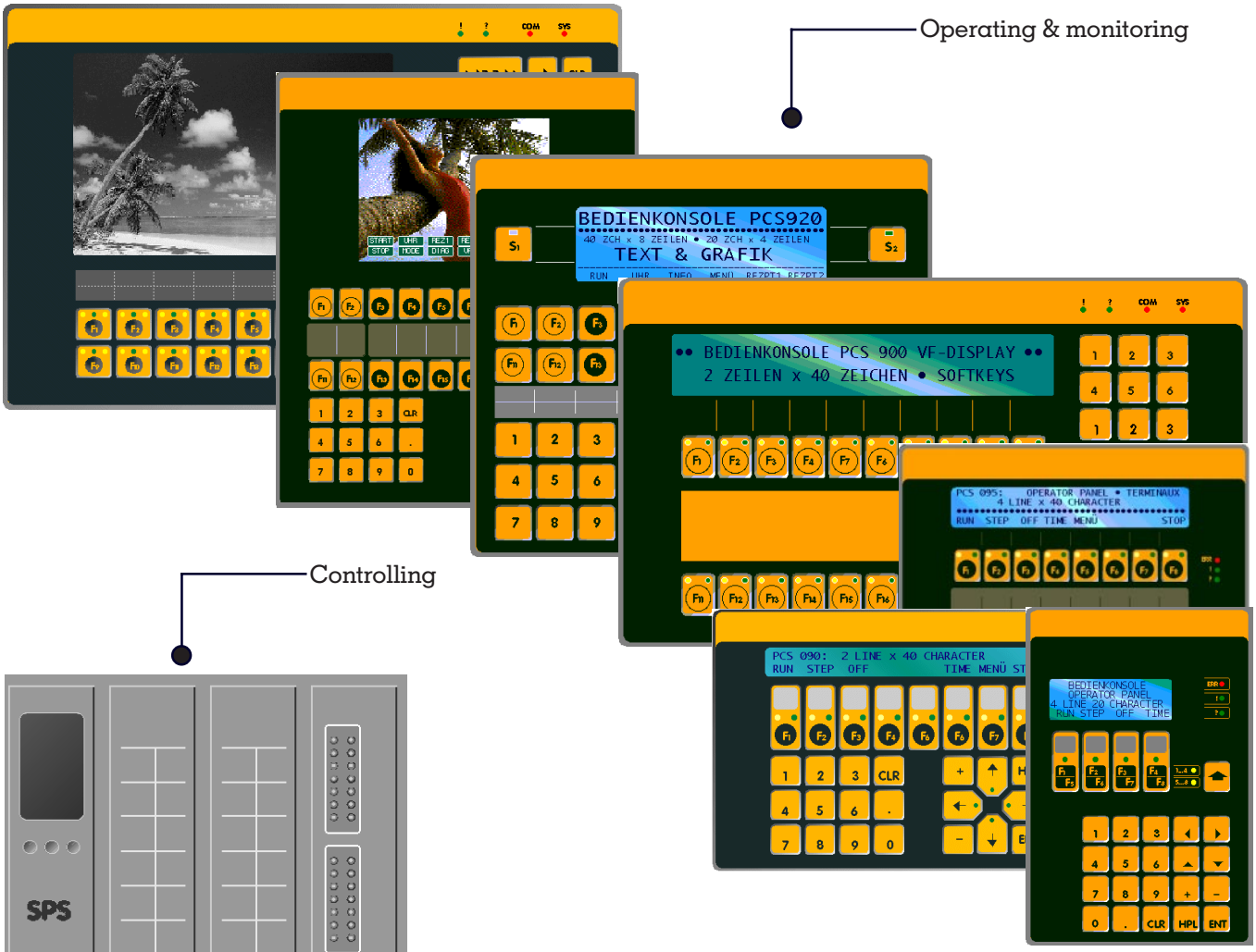
What to know
Information marked with this symbol are required for a fast commissioning.

What you should know
Information marked with this symbol present further explanations to the operation.

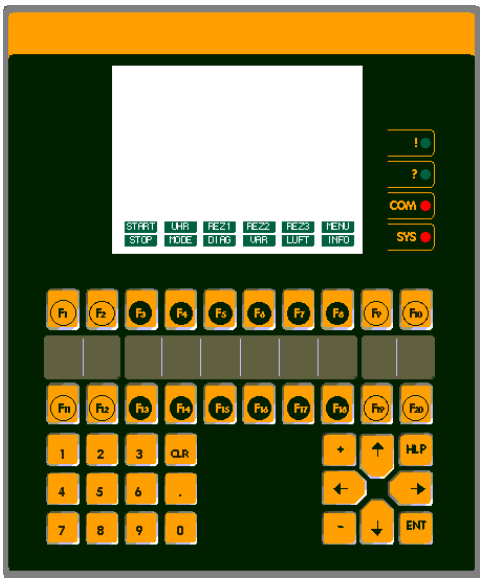


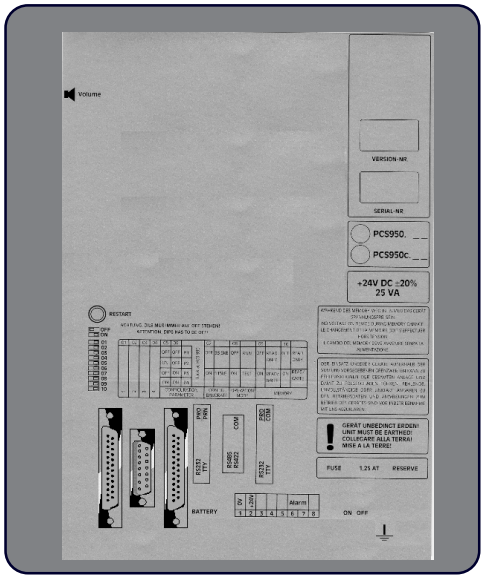
If you have some more time left
If you wish more detailed information then you should consider to read sections marked with this symbol.

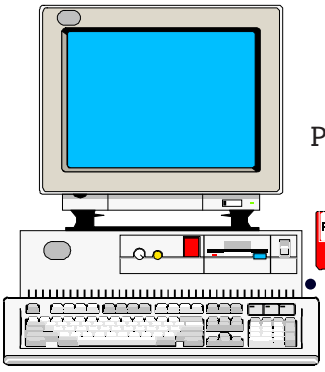




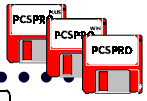
Programming and communication





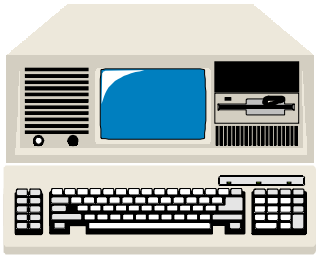


Configuring
using the software
PCSPRO/PCSPRO^{WIN}/
PCSPRO^{PLUS}



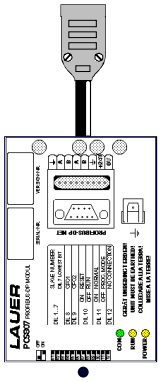
Programming
using the PCS 733
programming cable

PC with MS Windows

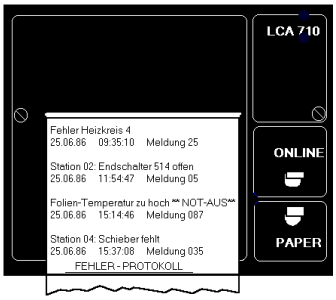


PG 7nn (MS DOS)

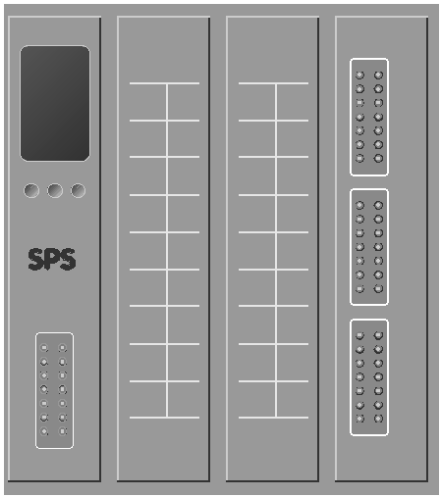
Communicating
using the PCS 807 Multibox
or the PCS 590p directly



Printing
using the LCA 035/235
printer cable



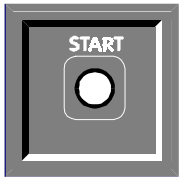
LCA 710 industrial printer



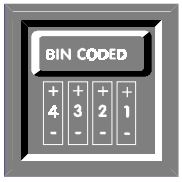
The operating console features a large selection of finished functions and tools for operating and monitoring:

- Function keys with up to 2 green/yellow pilot indicators each (OFF, ON, FLASHING, INVERSE FLASHING).
- 256 soft key bars with 255 different actions (with up to eight commands).
- Arbitrarily many switches with free labeling (texts or semi-graphics).
- Arbitrarily many selector switches with free labeling (texts or semi-graphics) and 256 switch positions each.
- Keyswitch or code lock for assigning different access rights.*
- Date and time - adjustable by the PCS or by the programmable controller.
- 8 timers with 8 cams each.
- Digital BCD/BIN preset value input via numeric keypad or INC/DEC keys: up to eight preset value variables per line.
- Simple ASCII preset value input.
- The display and modification of the bit pattern of a word (word variable) in the PCS are arbitrarily possible.
- Digital display of binary present values - alternatively up to 5 digits (0..65.535) or 10 digits (0...4.294.967.295).
- Automatic conversion of preset and present values from BCD/BIN into decimal and back incl. signs, limit values and scaling.
- Up to 1024 message pages with text variables in 3 message priorities and 5 erase modes.
- For idle pages, 128 pages are available with up to 8 variables per line each.
- Logging, machine report, output on printer or PC.
- 128 operating pages
- Analog preset value input and analog present value display.
- Up to 2 arbitrary languages with different character sets can be configured (3 languages using an additional cassette).

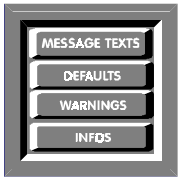
* Please refer to the unit description in the corresponding manuals on which tool to use for which unit.



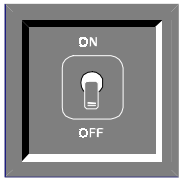
Keys



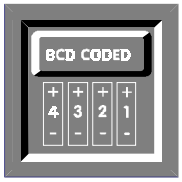
Binary preset value



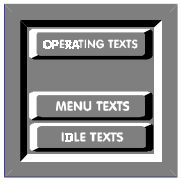
Message texts



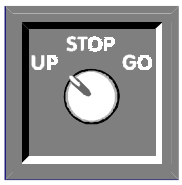
Switch



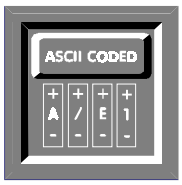
BCD preset value



Operating and idle texts

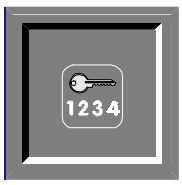


Slector switch

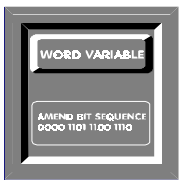


ASCII preset value

Help texts



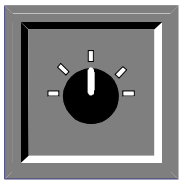
Code lock, key switch



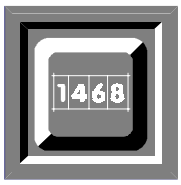
Change data word/flag

Logging, statistics, report

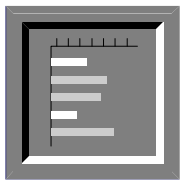
Date and time

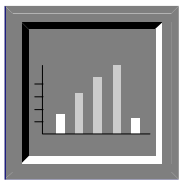

Analog preset value

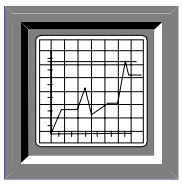
Preset value via menu

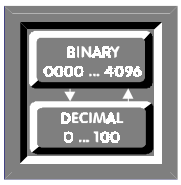


Istwert digital


Bargraph horizontal


Bargraph vertical


Limit values, scaling

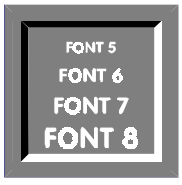


BIN/DEZ-conversion

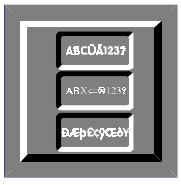

Graphic display

Softkey line

Actions



to 8 character size


several languages

The simple communication principle

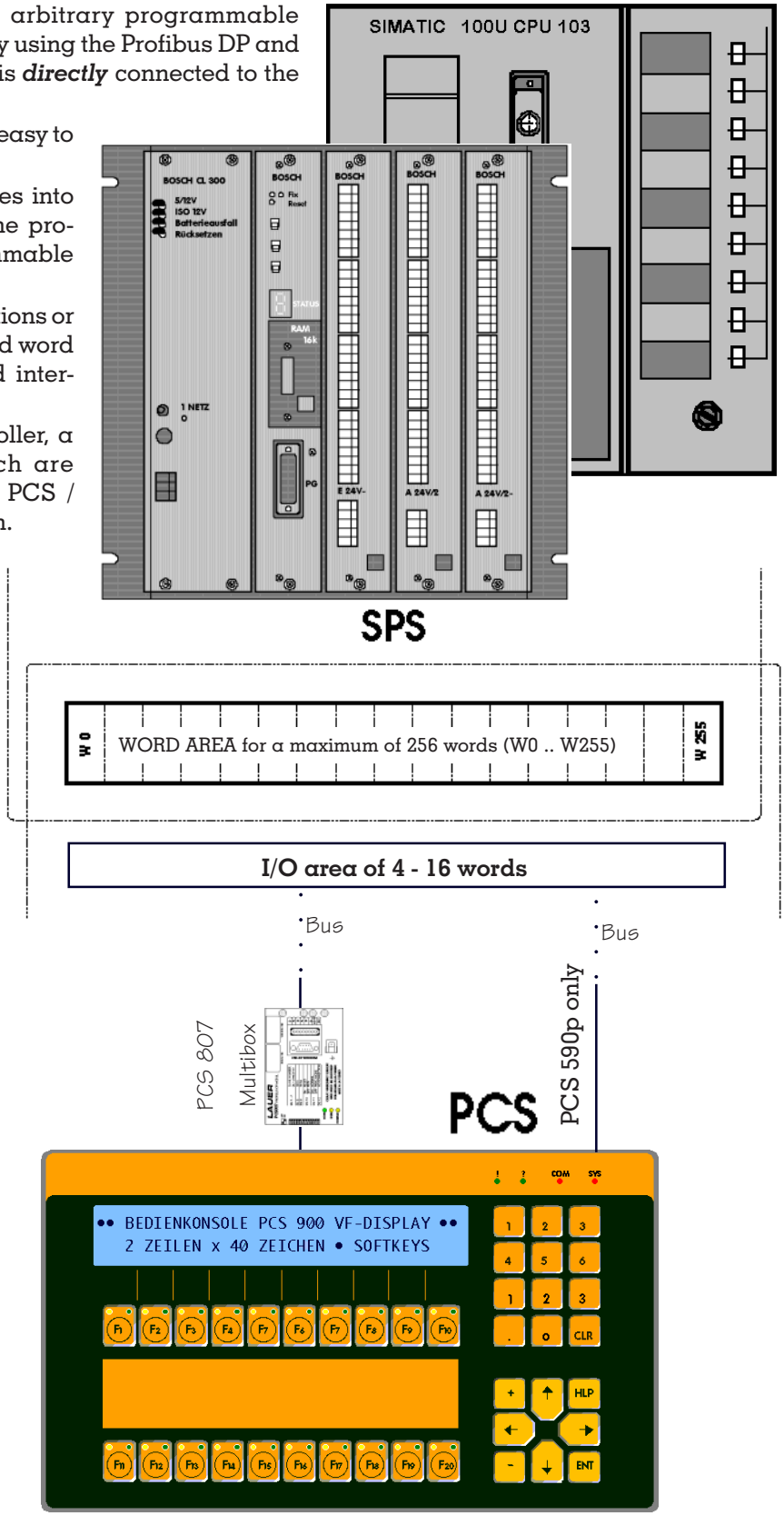
The electrical connection between an arbitrary programmable controller and the PCS topline is made by using the Profibus DP and the PCS 807 Multibox. The PCS busline is ***directly*** connected to the Profibus DP.

The data communication is based on an easy to understand principle:

The PCS writes functions or preset values into previously determined word areas of the programmable controller that the programmable controller then reads and interprets.

The programmable controller writes functions or present values into previously determined word areas, that are automatically read and interpreted by the PCS.

Depending on the programmable controller, a maximum 256 words with 16 bit each are available that means 4096 I/Os for the PCS / programmable controller communication.



... and the fast adaptation to a specific operating requirement

1 First, define the operating profile.
2 Assign the variables (preset and present values) to the words and/or bits.
3 Determine the texts for the operator guidance and for the display of machine states and help texts.
4 Determine the message texts and associate these to words, subdivide the message texts into 3 priority groups.
   - Notes
   - Warnings
   - Faults

   and consider the different erase behaviors, display and message modes. The programmable controller can change display and message modes at any time.
5 Define the menus and the operating texts.
6 Transfer the data record (variable, texts, menus) created in the PC or PU under the MS-DOS/DRDOS operating system into the PCS using the PCSPRO/ PCSPRO^{WIN}/PCSPRO^{PLUS} software.
7 Implement and parameterize the programmable controller specific handling software (PCS 91.PDP, refer to the Info overview) in the user program.
8 Connect the PCS to the programmable controller using the PCS 807 Multibox (or directly when using the PCS 590/595p):

   Jointly test the operation and control between the PCS and programmable controller and optimize if necessary.

Quality and support

Quality is the most important factor in our company. From the electronic component to the manufactured device, all is competently tested by our quality assurance department.

For this purpose, national and international standards (ISO, TÜV, CE, Germanischer Lloyd) are applied. Each PCS is tested to a 100% and submitted to a permanent test under worst case conditions for 48 hours. Thereby, it is tested at different temperatures (5...55 C) and test voltages (19..33 VDC). This is to assure a maximum of quality.

Our products are not only characterized by a maximum economy and reliability but also by a comprehensive complete service.

- Qualified user advice by competent sales and application engineers.
- Our support is available to you every day by word and deed. Use our direct info line if you have questions concerning the PCStopline.

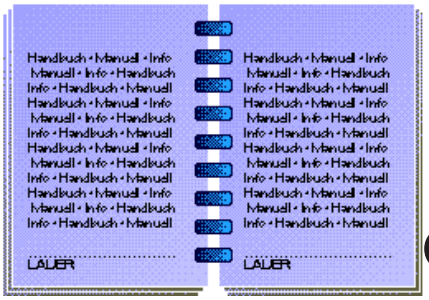
  Telephone: +49(0)7022/9660-220 ... 223 + 230, 231

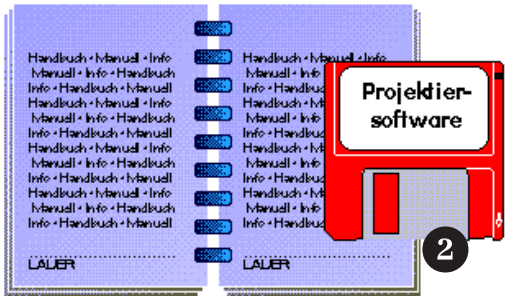
  Fax: +49(0)7022/9660-224

  Lauer mailbox: +49(0)7022/9660-225
- Intensive and practice-orientated training for our products. Either at our training center or - after agreement - at your site.
- You do not only receive demo devices but you are also supported during your first application by our specialists.
- Update service for our software.

From the advice to the user support, from the hotline to the service, from the manual to the training - a comprehensive individual service is guaranteed.

Manual organization





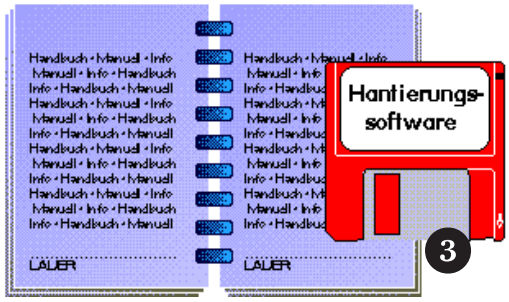
❶ **PCS 091/591 manual**
for PCS micro, mini
PCS 925/991/995 manual
for PCS midi
PCS 9091 manual
for PCS maxi

❷ **PCSPRO**
Configuration software for PCS 009/090/095/900
PCSPRO^{WIN}
Configuration software for PCS 920/950
PCSPRO^{PLUS}/PCS 9092
Configuration software für PCS 9000/9100

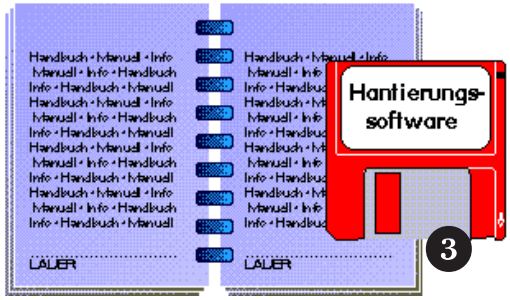
For the PCS topline you require the PCS 091/591/925/991/995, or 9092 technical manual (1).

You need the PCSPRO/PCSPRO^{WIN}/PCSPRO^{PLUS} configuration software for configuring the operating console. We supply the software with a short introduction (2).

Use the corresponding matching programmable controller driver for easy communication of the PCS with your programmable controller. Along with the handling block on one 3,5" floppy disk (3), you receive an exact driver description as an appendix to the PCS 091 manual. The following order numbers are valid for the various driver appendices:



❸ **Appendix to PCS 091**
PCS 91.AEG handling software for AEG



❸ **Appendix to PCS 091**
PCS 91.GEF handling software for Ge-Fanuc

PCS 91.ABB	for ABB-PLC
PCS 91.AEG	for AEG-PLC
PCS 91.ALB	for Allen Bradley-PLC
PCS 91.B+R	for Bernecker+ Rainer-PLC
PCS 91.BOS	for Bosch-PLC
PCS 91.CEG	for Cegelec-PLC
PCS 91.CRO	for Crouzet-PLC
PCS 91.EBE	for Eberle-PLC
PCS 91.FES	for Festo-PLC
PCS 91.GEF	for GE-Fanuc-PLC
PCS 91.HIT	for Hitachi-PLC
PCS 91.IPC	for IPC-PLC
PCS 91.IZU	for Izumi/Idec-PLC
PCS 91.KLM	for Klöckner-Moeller-PLC
PCS 91.MAT	for Matsushita-PLC
PCS 91.MIT	for Mitsubishi-PLC
PCS 91.OMR	for Omron-PLC
PCS 91.PHI	for Philips-PLC
PCS 91.SAI	for Saia-PLC
PCS 91.SEL	for Selectron-PLC
PCS 91.SIE	for Siemens-PLC
PCS 91.TEC	for Teco-PLC
PCS 91.TMQ	for Telemecanique-PLC
PCS 91.TOS	for Toshiba-PLC
PCS 91.IBS	for Interbus-S
PCS 91.PDP	for Profibus-DP

Please pay attention to the matching programmable controller adapter cable.

and further appendices

Technical Manual PCS / VPC 91.PDP

for the PCS 807 Profibus-DP-Multibox
and PCS 590p/595p

A

Table of contents

Table of contents

A

About what does this manual report?

This manual informs you exclusively about the application of the PCS 807 Profibus DP Multibox together with the PCS micro, mini/VPC 090 Multi Interface, the SIEL2DME.DRV midi and maxi driver and the programmable controller handling software PROFIBUS.S5D or PCSS7L2.AWL (S7). **The PCS 590/595p operating consoles do not require the PCS 807 Multibox since this is integrated into the PCS 590p/595p. The settings of the master board and the use of the handling software is absolutely identical. Therefore, this principle is used for the here described procedure.**

The network structure set-up was tested with a S5-115U (CPU 942, 943, 944, 945), an S5-135U (CPU 928) in connection with an IM308B (version 6) S5 DP master board, an IM308C (version 2), and a CP5431 (version 3). The setup was also tested with an S7 fitted with a CPU 315-2 DP. The following describes the startup of this set-up.

The PCS 807 firmware is based on the Siemens SPC-3 chip set with Siemens object code. Systeme Lauer can take over no responsibility for errors and limitations due to the Siemens software.

Programming of the Siemens programmable controllers, of the Profibus master board, and the basic Profibus DP functions are assumed as known.

A.1.1 Which parts do I need?

The following products are required from Systeme Lauer for a Profibus DP network set-up:

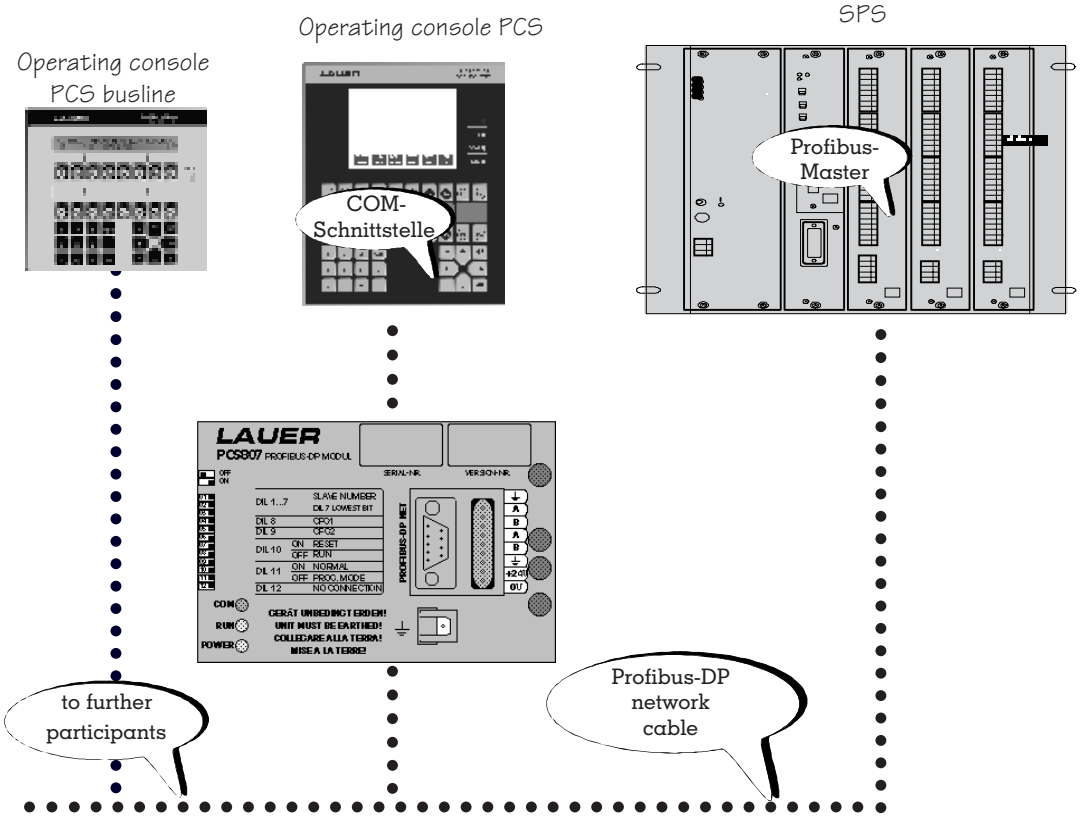
- PCS807 Profibus DP Multibox, version PX807 0001 (SPC2), or PX807 1000 (SPC3), or higher.
- A PCS micro, mini, midi, or maxi operating console or the VPC 090 Multi Interface.
- The PCSPRO, PCSPRO^{WIN}/PCSPRO^{PLUS} or PCS 9092 configuration software and a PCS 733 programming cable for the PCS operating console.
- This manual including the PCS91.PDP floppy disk.

....as well as power supplies for all components.

A.2.1 Basic data interchange

The communication connection between the PCS and the programmable controller data area is made via the following communication devices:

PCS operating console
⮟
(PCS807 Multibox) Profibus DP
⮟
Profibus master
⮟
Programmable controller
⮟
Profibus master
⮟
(PCS807 Multibox) Profibus DP
⮟
PCS operating console



PCS operating console
The PCS operating console determines the tasks to be executed (according to the network configuration, the enables, the display content, and the keys) and sends these in one package to the PCS 807 Multibox Profibus DP slave.

The PCS 807 Multibox Profibus DP slave passes the package on to the Profibus master.

The master stores the package in the I-area of the programmable controller.

Programmable controller
The communication data block is located in the programmable controller and occupies 256 words (e.g. DB50).
The tasks input buffer is located in an I-area of the programmable controller.
The tasks response buffer is located in an O-area of the programmable controller.
A cyclically selected handling block (FB203) executes the tasks present in the I-buffer on the data block and stores the result in the O-buffer.

The master picks up the response package from the O-area of the programmable controller and submits it to the slave.

The PCS 807 Multibox Profibus DP slave submits the response to the PCS.

PCS operating console
The PCS operating console evaluates the response and shows the data on the display.

The inquiry/response package is supplied with a task number so that the response always matches the inquiry.

With the PCS 590p/595p, the intermediate steps referring to the PCS 807 Multibox are skipped. The master communicates directly with the PCS.

A.2.1 Settings of the Multibox slave

The PCS 807 Multibox Profibus DP slave automatically adapts to the given configuration. For this, only the slave number of the PCS 807 Multibox Profibus DP needs to be set. Using the DIL-switches 1 to 7, you can set the slave number of the PCS 807 Multibox Profibus DP between 3 and 127. The settings must be performed either with the power being removed or in the reset state (the settings are taken over at the start).

The slave address is calculated as follows (OFF = 0 and ON = 1):

DIL1 x 64 + DIL2 x 32 + DIL3 x 16 + DIL4 x 8 + DIL5 x 4 + DIL6 x 2 + DIL7 x 1

Slave-Nr	DIL 1	DIL 2	DIL 3	DIL 4	DIL 5	DIL 6	DIL 7
3	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	ON	ON	ON
...							
125	ON	ON	ON	ON	ON	OFF	ON
126	ON	ON	ON	ON	ON	ON	OFF

The slave number of the PCS 590p/595p is set in the driver using the PCSPRO configuration software. Select the *Project* menu item and then *Driver parameters*.

A.2.2 Parameterizing of the PCS

Both, the application program with data and a selected driver is transferred when configuring the PCS. The presettings of the variable can be changed for optimizing the driver.

Variable AJ - number of tasks per package

Using this variable, the number of tasks per task package can be influenced. Thus, this variable is influenced by the size of the I/O buffer. Furthermore, the refresh of the variable and the refresh of the keys/LEDs is offset by this value. The relation is explained best using an example:

AJ = 1 ➠ Keys and LEDs will be quickly transferred, variables are refreshed slowly - suited for jog operation. The I/O buffer can be small.

AJ = 10 ➠ Default values. Represent a balance between the key and the variable refresh.

AJ = 20 ➠ Keys and LEDs will be transferred simultaneously with variables - suited for the display of many variables. The I/O buffer should be as large as possible.

AA variable - Time-out time

The time-out time to be set is related to the maximum time that is required by the programmable controller for the cyclical call of the communication program plus the communication time. The time is adjustable in the range of 2 and 9.9 seconds - default is 4 second. Time monitoring is activated only if the task read by the PCS is not yet the current one.

In addition, the PCS 590p/595p features the following variables:

AH variable - PCS station number

Here, the slave station number of the Profibus DP slave is set. The value range is 3 (default value) to 127.

BC variable - Direct key values

You can reserve 0 2 words of the programmable controller I/O area for the direct transfer of keys. These keywords are then constantly assigned to the key bits and are directly to be evaluated. The key transfer time is significantly faster compared to the PCS transfer since no interpretation of the data is required. You can use these key words for jog operations.

Assumed, you have reserved 16 bytes from I20 to I35 for slave 3 that is a PCS 590p/595p.The key words are assigned to I20 to I23 if you have set 2 key words. These words are now lost for the PCS Expander communication: set the start of the Expander (e. g. RXFA) to 24 and the length (e. g. RXLE) to 12. Please note that you can only reserve one word for direct keys of an input area having a size of eight bytes.

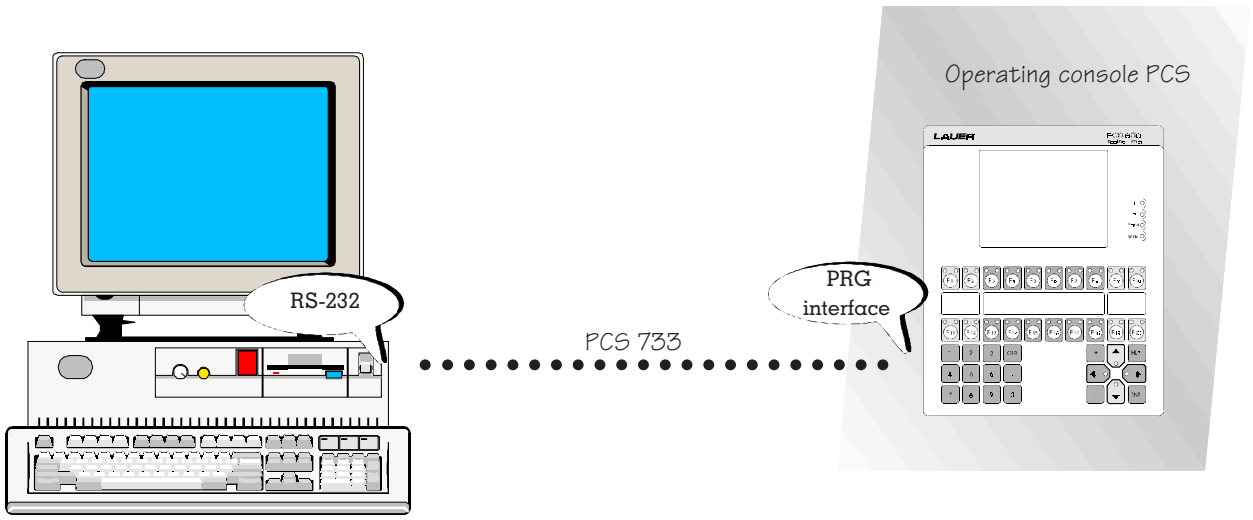
BD BG variables - Contents of the key bytes

Using five instances, you can assign the key words of each byte a certain information (key bits).

Please refer to the PCS 591 manual for further information on key bytes.

A.2.3 Transfer of the record into the PCS

1. Set DIL-switch 8 on the rearside of the PCS to „OFF" and DIL-switches 9 to „ON". (Not with the PCSmaxi)
2. Apply operating voltage (19 ... 33V) to the PCS. The ERR-LED is now ON.
3. Connect the programming interface of the PC with the PCS operating console using the PCS 733 programming cable.
4. Run the PCSPRO/PCSPRO^{WIN}/PCSPRO^{PLUS} configuration software.
5. Select the Profibus DP driver for your PCS.
6. Create or load your data file.
7. Set the driver parameters using the menu items „Options" and „Drivers". You can take over the default settings in the normal case.
8. Transfer the compiled record into the PCS.



A.2.4 Set-up and first powering-up

Disconnect the supply voltage to the set-up when you have configured all parts. Thereby, the following points are to be considered:

Profibus DP network

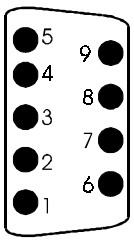
- Use only suited cable for the wiring.
- The last participant in the Profibus DP network must have a terminator. Use the Siemens SINEC L bus connector for this. Special bus connectors are required for baud rates between 3 and 12 MHz (Siemens part number: 6ES7 972-0BA10-0XA0).

  Instead of the Siemens connectors you can also use the supplied Lauer terminals between PCS 807 Multibox Profibus DP slaves (only recommended up to 500Kbaud).

  When using the Lauer terminals, the red wire is connected to „A" and the green wire to „B". The cable screening is connected to the cable clip (not with the PCS 590p/595p).

Proceed as follows for powering-up:

- Supply power to the programmable controller and to the PCS 807 Multibox Profibus DP.
- The „SEND" LED of the master board is activated after a maximum time of 5 seconds. Then, the green „COM" LED of the PCS 807 Multibox or of the PCS 590p/595p lights statically.
- Now, connect the PCS (COM interface) to the PCS 807 Multibox Profibus DP (not the PCS 590p/595p).
- Set the restart input of the programmable controller to „ON" or switch the programmable controller from STOP to RUN.
- The „COM" LED of the PCS is deactivated after a maximum time of 2 seconds.

View	Pin	Signal name	Designation
	1	-	-
	2	-	-
	3	RxD/TxD-P	data line - B
	4	RTS	request to send
	5	M5V2	data reference potential (from the station)
	6	P5V2	power supply plus (from the station)
	8	RxD/TxD-N	data line - A

Mechanical mounting of the PCS 807 Multibox Profibus DP

The PCS 807 Multibox Profibus DP can be mounted on a top hat rail (DIN rail). The PCS operating console and the PCS 807 Multibox Profibus DP must be earthed!

PCS 807 Specifications

A

Description:	PCS 807 Multibox Profibus DP slave
System requirements:	Standard Profibus DP network according to DIN 19245
System assignments:	• min. 8 bytes in the input area of the programmable controller min. 8 bytes in the output area of the programmable controller • max. 32 bytes in the input area of the programmable controller max. 32 bytes in the output area of the programmable controller
Mounting dimensions:	height: 50 mm width: 80 mm length: 120 mm (without cable)
Supply voltage:	24 volts ± 10 %
Current consumption:	200 mA max.
Power consumption:	5 VA max.
Operating temp. range:	0 ... +50° C
Storage temp. range:	- 20 ... +80° C
Interfaces:	• RS-232 interface with 25-pin sub D female connector to the PCS operating console • RS-485 interface with 9-pin sub D male connector • RS-485 interface with 8-pin terminal strip and 24 volts supply voltage
Indicators:	• 1 yellow LED for supply voltage • 1 yellow LED for LOAD/RUN state • 1 green LED for communication state
DIL-switches:	• DIL 1 .. 7 for setting the slave address • DIL 10 as reset switch • DIL 11 for switching from LOAD to RUN

Warning!
Statically charging of the frontpanel is possible. Clean only with a damp cloth.

Note!
We recommend to change the buffer battery of the internal RAM every five years. The unit must be powered up to prevent a data loss of the log memory and the message printer. In rare cases, the danger exists that the internal clock runs with a false speed if the unit is powered down.

Warning!
The LC display contains poisonous substances. Do not touch it in case it is broken.

- The device may only be connected to the systems specified by Systeme Lauer.
- Only trained and qualified persons who have familiarized themselves with the product are allowed to install and operate the device.
- The responsibility of persons operating the device must be clearly determined in order to avoid undefined competencies.
- The relevant safety regulations and standards must be observed.
- Before commissioning the device, this instruction manual must be read thoroughly.
- Modifications of or changes to the design of the device are not allowed. Systeme Lauer is not responsible for resulting damages.
- The supply voltage of the device must be within the range specified in the section „Specifications". Systeme Lauer is not responsible for damages resulting from non-compliance to this requirement.
- The latest manuals and documentation are valid.
- The unit may only be used in applications outlined in the equipment specifications and in the user manual. Furthermore, the unit may only be used together with foreign units and foreign components recommended or approved by Systeme Lauer.

Warning!
Check the PCS function and the VPC 090 Multi-Interface after parameterization. All parameterized functions must be examined. Otherwise, malfunctioning of the programmable controller are possible.

Attention!
The PCS operating console and the PCS 807 Multibox Profibus DP must be earthed! (PCS 807 connected to grounding strap)

The unit was designed, manufactured, tested, and documented according to relevant safety standards. In the normal case, the instrument does not represent any dangers concerning property damages or the health of persons.

Note!
A Profibus-conform environment according to EN 50 170 Volume 2, PROFIBUS is assumed.

The specifications published by Systeme Lauer were determined with our methods and facilities; characteristics are only guaranteed to this respect. The user is responsible for testing and determining the suitability for the specific application or for use under actual conditions. Systeme Lauer does not assume any warranty for this.

Modifications reserved

PCS 807 Profibus-DP Multibox or PCS 590p/595p connected to Siemens PLC with I/O communication

For a Profibus-DP network setup are required by Siemens following products:

- a S5-SPS or S7-300 (400) with Profibus-DP master
- a Profibus-DP master plug-in module (only for S5), version IM308b (version 6), IM308c (version 2) or CP5431
- Programming software for the programmable controller and the master board
- Profibus-DP network cable and bus connector

... as well as the power supply for all components.

The settings of the components must match to enable all parts to correctly work together!

IM308 master board

Search for the right slot for your board. Otherwise, it may be damaged. The possible outlets are hatched gray.

Slots in the S5-115U system:

Module rack CR 700-0:						
PS	CPU	0	1	2	3	IM

Module rack CR 700-2:									
PS	CPU	0	1	2	3	4	5	6	IM
Module rack CR 700-3:									
PS	CPU	0	1	2	3	4	5	6	IM

Slots in the S5-135U and S5-155U system:

Central unit S5-135U:																			
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163
Central unit S5-155U:																			
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163
Central unit S5-135U/155U:																			
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163

Master board (S7 Profibus master)

You determine the Profibus-DP network by configuring the master board (S7 Profibus master).

The following limits are valid for a slave:

- maximum number of bytes = 32 for I/O buffer
- minimal number of bytes = 8 for I/O buffer
- optimal number of bytes = buffer size of 12 inputs and 24 outputs for PCS micro/mini
  = buffer size of 24 inputs and 32 outputs for PCS midi and maxi

B.1.1 Configuration of the master board (S5)

You define the settings of the Profibus-DP network in the COM ET200 software. Also, each slave must be defined with its data length.

IM308b (version 6)

To be able to define the PCS 807 Multibox Profibus DP slave, you have to copy the „PCS002TD.200" file from the PCS91.PDP diskette (please note the README.TXT file) into the COM ET200 directory.
Pay attention, that under DOS the last drive statement is set to „LASTDRIVE=Z" before executing the software.

IM308c (version 2 or higher)

Copy the „LAUERDPX.200" type data into the „'Typdat5x" sub-directory.

CP5431

In the DP editor, set the slave interval time manually.

Call up now the COM ET200 software for an IM308b (version 6)...
ET200 parameters

- the baud rate should be between 187.5 and 1500 Kbaud.
- the bus profile must be selected as „Standard Profibus-DP".
- the CPU type must be correctly selected.
- a diagnosis is not required.

Config parameters

- here, you determine the slave parameters.
- select the parameter file: „LauerDP slave 50" for IM308b,
- set the consistency to „0".
- define 8 ... 32 input bytes and 8 ... 32 output bytes per slave.

Call up the COMWIN10 software for an IM308c...
Bus parameters

Select Profibus-DP

Host parameters

Select the used CPU

Master parameters

- station type: IM308c
- addressing type: select the linear range for the P or Q page frame. P or Q tiles are possible in the page frame. Then, select the number of the IM308c (0/16/32/48). Each IM308c manages up to 16 tiles.
- error message mode: Can be set to QVZ (acknowledgment delay on error).
- set the response monitoring to: ON

Slave parameters:

- select the „LAUER_PCS_LCA" type file.
- you can SELECT P000-P255 and Q000-Q255 in the linear range.
- OP192-15P255 is possible in the P page frame.
- 0Q0-15Q254 is possible in the Q page frame.
- specify the input bytes between 8 and 32and the output bytes between 8 and 32.
- sync or Freeze are not necessary.
- activate Module Consistency.

Transfer

Now, program the EPROM cassette or the Flash module and plug this into your IM308 board.

Note the slave settings for the programmable controller programming.

Call SINEC.NCM for a CP5431 (version 4.6).

In contrast to the IM308 board, the CP5431 sends no configuration telegram. Thus, the setting on the boards and in the PCS 807 must agree.

I/O byte	8/8	16/16	24/24	32/32
DIL 5	OFF	ON	OFF	ON
DIL 6	OFF	OFF	ON	ON

The settings of DIL-switches 8 and 9 are taken over after a power up or reset.

For a PCS 590p/595p, DIL-switches 5 and 6 are used for the configuration selection:

I/O byte	8/8	16/16	24/24	32/32	
DIL 5		OFF	ON	OFF	ON
DIL 6		OFF	OFF	ON	ON

The CP5431 works only together with the SPC3 chip. Therefore use the PX807 1000.

The Profibus-DP function may only be combined with asynchronous FMS services! Use only the I/O area of bytes 0...127 in the 115U CPU 941-943 programmable controllers. Otherwise, inconsistencies can appear.

Please note, that not all RAM modules are permissible for the CP5431 board!

Please note following settings:

CP INIT:

Network file: NETZ2NCM.NET

Network parameters:

Default SAP: 61

Peripheral/ I/Oarea:

DP Update: Cycle synchronous
Input and output areas: enter ZI/DP start (even) and ZI/DP end (odd).

Peripheral/ DP slave parameterizing:

Maker ident: 0008
Sync mode: OFF
Freeze mode: OFF

Peripheral / DP editor:

Global data:

Largest min. slave interval: 2 x 1ms
Min. poll cycle time: 1 x 10ms
response monitoring time: 20 x 10ms

Discontinue the user interface accordingly. Perform a network balance using the „NETZ2NCM.NET" file and transfer database file into the CP5431.

B.1.2 Configuration of the L2-DP network (S7)

Sinec L2-DP network

A Sinec L2-DP network is composed of a DP master and DP slave which are connected by a bus cable. They communicate with each other using the DP (decentralized peripheral) protocol.

DP master

As DP master you can use:

- a CPU with firmly integrated or pluggable DP master interface (firmly integrated into e.g. CPU 315-2 DP)
- a interface module that is assign to a CPU/FM (e. g. IF 964-DP in CPU 488-4)
- a CP together with a CPU (e. g. CP 342-5: this is parameterized using a special software in called up STEP 7).

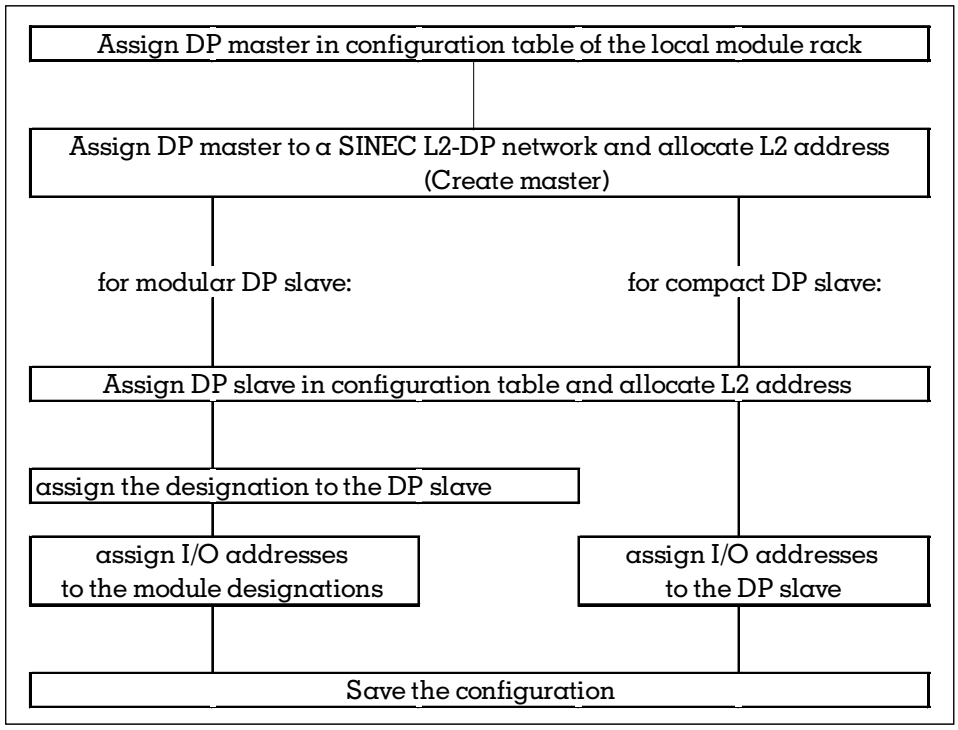
DP slaves

As DP slaves you can use:

- modules with integrated digital/analog I/O channels (compact DP slaves, e. g. ET 200B, PCSS 807 or LCA 3xx.3)
- interface modules with associated S5 or S7 modules (modular DP slaves, e. g. ET 200M).

Procedure

Basically, you configure a SINEC L2-DP network using the Step7 software (hardware configuration) just with a local setup. Go ahead as follows:



Conversion into a configuration table
Allocate the DP master locally to a module rack. Allocate the DP slaves to an own configuration table. The change to this configuration table is only made after you have configured the DP master.

B.1.3 Defining a master system

- **Requirement**
  You have called up the configuration table.
- **Master system**
  All DP slaves associated to a DP master and the DP master form a master system. A master system is part of a SINEC L2-DP network.
- **Master system definition**
  After you have allocated the DP master in the configuration table, you define the pertinent master system.
  A master system means that you associate the DP master a SINEC L2-DP network and assign an L2 address to the DP master.
- **Select and allocate a DP master**
  You select a DP master from the module catalogue and position it in the configuration table.
  Result: if the DP master is an integrated interface of a CPU then a „+" is indicated to the left of the CPU. A second line appears with the DP master if you click onto the + sign.

Further procedure:
If you have allocated the DP master in the configuration table then you can either:
- continue to allocate the „local" modules in the configuration table

or
- configure the SINEC L2-DP network further by associating the DP master a SINEC L2-DP network and assign it an L2 address.

- **L2 address**

For the unambiguous identification, you must assign an L2 address to each DP master and DP slave of a master system in the SINEC L2-DP network.

- **Network and L2 address assignment**

Go ahead as follows to assign the network and L2 address:
1 mark the line in which the DP master is found.
  select the **Edit -> Master system -> Open** menu command. The dialog field for the network and L2 address assignment is displayed.
2 assign the DP master a SINEC L2-DP network (a default network is offered).
3 assign an L2 address to the DP master (the lowest free L2 address is offered as default value).
  Result: the „Master system configuration table" is displayed after the assignment of the SINEC L2-DP network and L2 address.

Master system configuration table
In the master system configuration table, you allocate and parameterize all DP slaves of a master system.

Select and allocate a DP slave

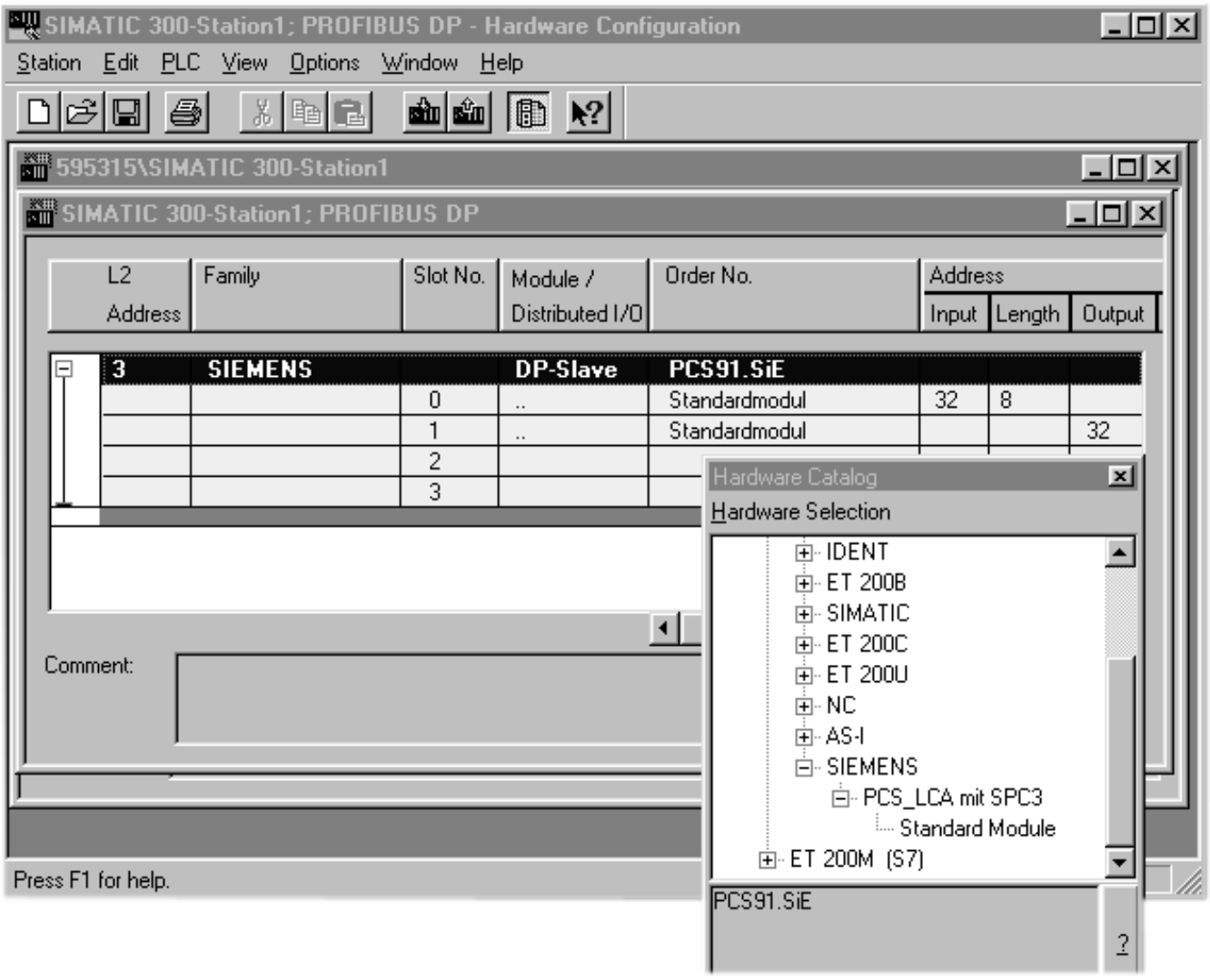
Go ahead as follows to allocate a DP slave in the configuration table:

1 You must create the type file:
From the PCSS 91.PDP diskette copy the LAUSPC3X.200 file into your STEP7\S7DATA\TYPE FILE directory. Open your configuration table. Select the **Extras Update type files** menu command on. Now, close your application and restart the STEP 7 software. The type file has now been entered in your hardware catalog.

2 Select the PCS_LCA with SPC3 DP slave from the hardware catalog (to be found under ProfibusDP\Normslave\Siemens).

3 Allocate the DP slave in the configuration table. STEP 7 offers you automatically the free L2 addresses in a list box. The next free L2 address is offered as default value.

4 Assign the L2 address.



Allocate modular DP slave modules

Go ahead just as if you allocate modules in a local setup to allocate modules to a modular DP slave. Please note that the DP slave must be opened before you can associate modules (click onto „+").

Now, insert 2 standard modules.

Assign a designation to a modular DP slave

Designations are assigned to modular DP slaves. the characteristics of the modules, e. g. addressing range and consistency of the data are encoded in the DP designation.

The DP designation is automatically displayed if you insert the module in the configuration table. You can edit the DP designation by double-clicking onto the line of the DP designation.

Assigning of I/O addresses

Each input/output of a DP slave is assigned to exactly one address that is used for addressing. Therefore, you must assigned a starting address to each module/DP designation of a DP slave.

STEP 7 automatically presents default addresses when you insert the module/the DP slave in the configuration table. The default addresses and their lengths are entered in „I addr." and „O addr." and „length columns.

Enter the number of the input and output bytes for each slave. You can select between 8 and 32 bytes.

Note the I/O address for the programmable controller programming!

B.1.4 Programming of the programmable controller

In the following, „FC" is valid instead of „FB" for an S7 application.

You find the „README.TXT" in the root directory of the PCS91.PDP floppy disk. The relevant handling block for each project is described in this file. Load the handling block for the Profibus-DP project into the programmable controller for a first test of the connection. With a Siemens S7, load the "PCSS7L2.AWL" file as S0 object (source) and compile it. (In case you are using a S7 300 then OB 101 should be deleted after compilation since it can only be used with the S7 400). Edit FB 201 and FB 202 (S7: FC 101 and FC 102). Adjust the assignment to the one of the PCS. Remove the stop commands! The PCS data block must be present in the start OB.

Please note that the MB 236 ... 255 are used as temporary flags.

For each PCS 807 Multibox Profibus DP slave, include a call of the handling block FB 203 („PROFIB-PS5D" for the P page frame, „PROFIB-Q.S5D" for the Q page frame or PCSS712.AWL for the I/O area of an S7) in your programmable controller program. In case you are using the P-page frame or the Q-page frame, you must set these before calling the FB 203. In the calling parameters, you define:

UBDB	the name of the data block, e.g. DB50
RXFA	the location of the I-buffer (same as master board), e.g. KF +40 (S7: input location)
RXLE	the length of the I-buffer (same as master board), e.g. KF + 16
TXFA	the location of the O-buffer (same as master board), e.g. KF +50 (S7: output location)
TXFE	the length of the O-buffer (same as master board), e.g. KF + 16
RSET	the restart input, e.g. E0.0
TIMES	the designation of the time-out timer, e.g. T5
TIMZ	the time-out time, e.g. KT 20.1 = 2 seconds
RFLM	the first start flag, e.g. M10.0
EROR	the error flag, e.g. A0.0
COFF	the error block, e.g. FB 202 (S7: FC 102)
INIT	the first initializing block, e.g. FB 201 (S7: FC 101)

Thus, the example is set to the following values:

- The I-buffer is located from PW40 to PW54 and/or QW40 to QW54.
- The O-buffer is located from PW50 to PW64 and/or QW50 to QW64.
- Timer is the time-out timer T5 with a value of 2 seconds.
- E0.0 is the restart input
- A0.0 is the error output
- FB 201 is selected in the first cycle.
- FB 202 is called only once at a communication loss.

B.1.5 Settings of the slave Multibox

The PCS 807 Multibox Profibus DP slave automatically adapts to the alleged configuration. Only the slave number of the PCS 807 Multibox Profibus DP must be set. You set the slave number of the PCS 807 Multibox Profibus DP using the DIL-switches 1 to 7 to a number between 3 and 126. The setting must be made with the power being removed or in a reset condition (the setting is taken over at the start).

The slave address is calculated as follows (OFF=0 and ON= 1):

DIL1 x 64 + DIL2 x 32 + DIL3 x 16 + DIL4 x 8 + DIL5 x 4 + DIL6 x 2 + DIL7 x 1

Slave-Nr	DIL 1	DIL 2	DIL 3	DIL 4	DIL 5	DIL 6	DIL 7
3	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	ON	ON	ON
...							
125	ON	ON	ON	ON	ON	OFF	ON
126	ON	ON	ON	ON	ON	ON	OFF

For the PCS 590p/595p operating console, the slave number is set in the driver using the PCSPRO configuration software.

Start-up the components in two steps

Step 1: Network

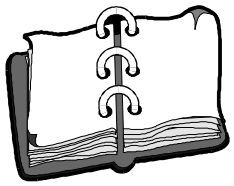
- Set up the Profibus-DP network.
- Supply power to the programmable controller and to the PCS 807 Multibox Profibus DP.
- The IM 308 „RN" LED is activated and the „BF" LED of the flashes.
- After about 5 seconds, the „BF" LED of the master board is deactivated and the green „COM" LED of the PCS 807 Multibox Profibus DP or the PCS 590p/595p is statically ON.
- With the S7, the „SF-DP" and the „BUSF" LEDs are deactivated.

Step 2: Logical communication

- Now, you can connect the PCS (COM interface) to the PCS 807 Multibox Profibus DP (not the PCS 590p/595p).
- Set the restart input of the programmable controller to „ON" or switch the programmable controller from STOP to RUN.
- The „COM" LED of the PCS is deactivated after a maximum time of 2 seconds.

B.1.6S5 demo project

A demo project for an IM308c is included on the Siemens floppy disk to enable a simple introduction into the Profibus-DP configuration. There, a Profibus-DP network with a PCS operating console in the linear P page frame area occupying bytes 0...15 is available. The procedure for commissioning is documented in detail in the enclosed README.DOC file.



B.1.7 Trouble-shooting

Programmable controller enters STOP mode

- The Stop commands in the handling software were not yet eliminated. Please eliminate these.
- Programmable controller STOP on Profibus-DP error set in master configuration. Get network up and running.
- Configuration of the master board is not compatible to the programmable controller. Please correct.

IM308 does not enter the RUN mode or flashes (S7: master)

- Wrong slot for IM308. Please correct.
- Configuration data are wrong, not programmed or EPROM or Flash module is missing. Examine your data and the cassette.

Programmable controller in RUN mode, IM308 „BF" LED (S7: „BUSF" LED) flashes longer than 10 seconds

- error in the network configuration. Please eliminate.
- PCS 807 Multibox Profibus DP not ready, because:
  - incorrectly connected. Please correct.
  - in the Load condition (DIL-switch 11 = OFF).

    first DIL 10 = ON,
    next DIL1 1 = ON,
    then DIL10 = OFF.
- in reset condition (DIL-switch 10 = ON). Set DIL10 to OFF.
- not powered up. Supply PCS 807 Multibox Profibus DP with 24V ± 10% voltage.
- wrong slave number. Set slave number correctly and trigger reset via DIL 10 (initiate reset with DIL 10 = ON, then DIL 10 = OFF)

Programmable controller in RUN mode, IM308 „BF" LED (S7: „BUSF" LED) OFF, PCS „COM" LED ON

- PROFIBUS block is not called in the programmable controller. Please link. FB203 configuration does not match the master board.

Time-out timer expired, set restart input to 0. (UEROR: =RSET)

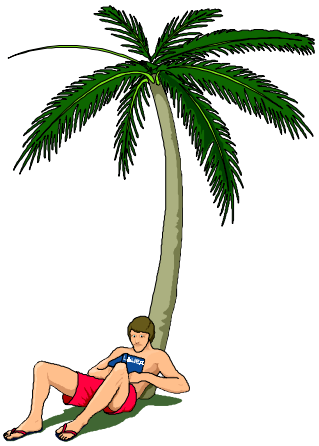
- PCS 807 Multibox Profibus DP DIL-switch 10 set to ON. Set PCS 807 Multibox Profibus DP DIL-switch to OFF.
- A wrong driver was loaded into the PCS operating console. Load the right driver together with the data record once more into the PCS operating console.
- IM308B start problems: the IM308B does not consider the slave interval time during the start process. Thus, it can cause problems with the PX807 001. Switch master board from STOP to RUN.

Programmable controller in RUN mode, IM308 „BF" LED (S7: „BUSF" LED) OFF, PCS „COM" LED OFF, later ON again

At first, communication is active (PCS „COM" LED is deactivated) but after a certain time, the „COM" LED starts to flash. This signals that the communication is basically functioning but a monitoring condition such as the time-out time was not observed. Possibly, the restart input is not set or the handling block is called irregularly.

PCS 807 Multibox Profibus DP power LED (yellow) does not light

- Power supply voltage 24 V + 10% must be observed.
- Supply voltage reversed applied. Please correct.
- Fuse in the unit is burned out. Send the unit in for repair.



B.1.8 Term of the communication

PCS 807 Multibox Profibus DP

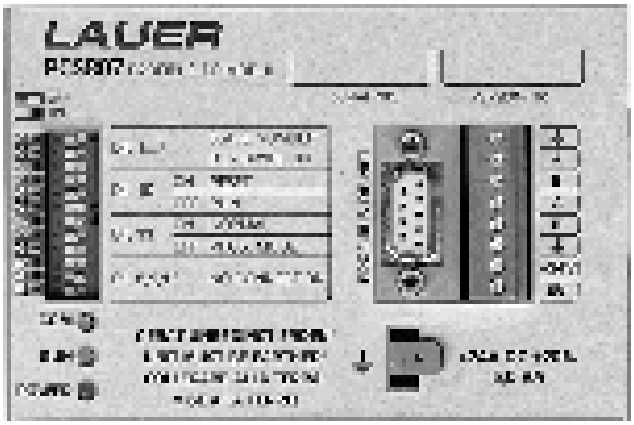
The PCS 807 Multibox Profibus DP software is based on the object codes of the Siemens company. In addition, serial communication and logical evaluation was added. Furthermore, the firmware is completely loadable.

Loading state

The PCS 807 Multibox Profibus DP is in the loading state if DIL 11 = OFF (yellow Run LED OFF), i. e. the EPROM is active and the EEPROM is externally addressable. Using a PC loader program, firmware can be now loaded into the unit using the serial interface. This is not necessary in the normal case since the unit is supplied with the firmware being loaded.

Run state

The PCS 807 Multibox Profibus DP is in the Run state if DIL 11 = OFF (yellow Run LED OFF) and the EEPROM program is active (the EPROM is switched off). To guarantee a defined initial start of the software, a reset must be triggered before the switching over DIL 10 to ON. This reset is then removed by switching DIL 10 to OFF again.



During the start, the firmware reads the DIP switches 1-7 and takes over these values as slave address. The firmware now can be run as independent slave on the Profibus-DP network.

The logical communication between PCS 807 Multibox Profibus DP and the programmable controller is started after plugging the serial interface into PCS 807 Multibox Profibus DP.

Structure of the logical communication

The Profibus-DP communication uses in Siemens the I/O area. Depending on the programmable controller, its size is between 128 bytes and several kilobytes (paging). A Profibus-DP master must be available in the programmable controller for communication. For this, Siemens supplies the IM308 board. The largest I/O unit that can be transferred is 32 bytes in size (thus, the largest configuration size of the PCS 807 Multibox Profibus DP is 32 bytes).

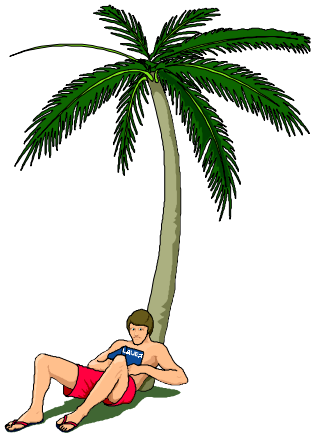
The configuration of the PCS 807 Multibox Profibus DP slave is determined with the IM308 master board (S7: Profibus master). The slave with the correct slave address automatically conforms to the configuration. This configuration will be submitted to the PCS operating consoles driver to setup the correct job/response packages.

According to the configuration, the driver in the PCS operating console splits the occurring jobs into part jobs. One-by-one, every part job is submitted to the PCS 807 Multibox Profibus DP for the transfer. A job number is attached to each transmission. The job is stored in the input area of the programmable controller. A programmable controller expander program reads the job and executes it on a DB. The result is stored in the output area with the job number being inverted. From there, it is submitted to the PCS 807 Multibox Profibus DP. Then, it is serially transferred to the driver.

The currently realized transfer times of PCS 807 Multibox Profibus DP to the programmable controller and vice versa are essentially limited by the SPC3 chip and the Siemens software to 50 msec min. Thus, a transfer „PCS 807 Multibox Profibus DP – programmable controller processing – PCS 807 Multibox Profibus DP" lasts approx. 150ms. Including the serial transfer, the processing of a part job thus lasts approx. 180 msec. At an average of 6 jobs for a PCS 090, a communication cycle lasts approx. 500msec. Thus, the key LED time is 2 x communication cycle = 1 second.

Visual monitoring

yellow „Power On" LED. It represents the functioning of the switching power supply.
yellow „RUN" LED. This LED is OFF in the loading state. It is ON in the Run state.
green „Communication" LED. This LED is OFF with communications being inactive. The LED flashes if a baud rate is recognized. The LED lights if a data exchange occurs.
With a PCS 590p/595p, a green „Communication" LED is available on the rearside of the unit. A data exchange occurs if it is activated. In addition, the „COM" LED on the PCS 590p/595p frontpanel is only deactivated if the handling software is correctly executed in the programmable controller.



B.1.9 Optimal configuration

The communication speed depends essentially on the following elements:

Occurring tasks in the PCS

The display content and the enabled transfers in the command words determine the tasks of the PCS operating console.

Slave configuration

An increased I/O buffer size in the programmable controller will also increase the processing speed of the jobs in the PCS. The output buffer should have twice the size of the input buffer.

AJ driver variable

This variable changes the refresh behavior of the variables and the keys.

AJ = 1 ➠ Keys and LEDs will be quickly transferred, variables are refreshed slowly - suited for jog operation. The I/O buffer can be small.

AJ = 10 ➠ Default values. Represent a balance between the key and the variable refresh.

AJ = 20 ➠ Keys and LEDs will be transferred simultaneously with variables. This setting is suited for the display of many variables. The I/O buffer should be as large as possible.

PCS 807 module version:

In the PX807 0001 version, a SPC2 chip is integrated that requires a min. slave interval time of 50 msec.

In the PX807 1000 version, a SPC3 chip is integrated that requires a min. slave interval time of 3 msec.

The version with the SPC3 chip is effectively approx. 3 times faster than the SPC2 version.

Configuration examples:

➢ **PCS 900**

- Slave configuration: 16 bytes I-buffer and 32 bytes O-buffer
- AJ = 10
- The command words in the programmable controller are used as follows:
  W36 = KH0F60
  W37 = KH0001

The transfer of the time and the date is disabled and a message block is enabled for the transfer. Now, you will have an optimal communication for the key LED area of less than one second if you take provisions to display only a few variables.

➢ **PCS 095**

- Slave configuration: 12 bytes I-buffer and 24 bytes O-buffer
- AJ = 10
- The command word in the programmable controller is used as follows:
  W13 = KH0FC 1

Thus, the messages M0 ... 15 are enabled for the transfer. Now, you will have an optimal communication for the key LED area of less than 0.8 seconds if you take provisions to display only a few variables.

➢ **PCS 095**

- Slave configuration: 8 bytes I-buffer and 16 bytes O-buffer
- AJ = 1
- The command word in the programmable controller is used as follows:
  W13 = KH0FC 1

Thus, the messages M0 ... 15 are enabled for the transfer. Keys will be transferred quickly but the refreshing of the variable takes a longer time. The key LED time totals approx. 0.5 seconds. However, if you press a key only for a short time then the LEDs are read only when the key is released again. Thus, the LED will not light.

➢ **PCS 9000**

- Slave configuration: 24 input bytes and 32 output bytes
- AJ = 10
- The command word in the programmable controller is used as follows:
  W13 = KH 000C (CLK_D bit on pos. 2) (CLK_C bit on pos. 3)
  W16 = KH 0
  W17 = KH FF00

The transfer of the time and the date is disabled. Display no external variables in the status window as far as possible.

➢ **PCSS 590p/595p**

- Slave configuration: 16 bytes I-buffer and 32 bytes O-buffer
- AJ = 7
- The command word in the programmable controller is used as follows:
  W13=KH 0FC4
  W27 = 0

Thus the messages M0 ... M63 are enabled for the transfer. Now, you will have a communication time of less approx. 0.8 seconds for the key LED area if you take provisions to display only a few variables.

C

PCS 807 Profibus-DP Multibox or the PCS 590p/595p for Bosch PLC with I/O-communication

The following Bosch products are required for a Profibus-DP network setup:

1 Cl400 programmable controller
2 DESI-DP or DESI-DP12 Profibus master board
3 programming software for the programmable controller and the master board
4 Profibus-DP network cable and bus connector
... as well as power supplies for all components

C.1.1 Configuration of the master board (DESI-DP)

The corresponding settings must match to secure a correct interaction of all parts!

Type file

Copy the „LAUERDP.GSD" file into your BOSCH.BIB directory.

This file is required for the master file to be created and contains all configuration possibilities of the PCS 807 slaves.

Call up now the Profi software of the master board. Select the DP software using F3. Create a new project or use the included PCS DP project.

Use F2 to enter the editor. Select the PCS 807 in the BTN overview. Under the Modules group select the configuration fitting your application best (size of the transfer buffer in bytes). Specify the slave address for the PCS 807 module or the PCS 590p/595p.

Now, switch to the BTN detail window using F5. Enter here the input and output bytes desired for the communication. You can use also the expanded inputs and outputs. Make sure that you specify an asending order since otherwise the handling block interprets the communication commands wrong.

The Desi-DP master board requires coupling field with a size of 6 byte for the data exchange. Set the starting address of the coupling field in the „Bus master settings" menu.

Load the master file into the master board. Consider the set baud rate of the software and the set baud rate of the master board.

Remark!

Note the set sizes for inputs and outputs, their start addresses and all other settings. They are required for the handling block or for the DIL-switch settings of the master board.

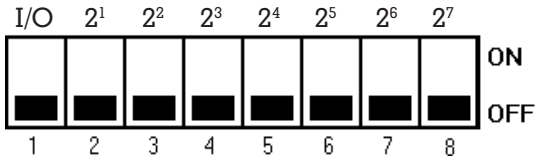
Hardware settings using the DESI-DP board as an example
(refer also to the Bosch DESI-DP Bus Master manual)

Set the coupling address using DIL-switch S4: switch 1 of S4 is used to select the addressing range.

- ON I/O field
- OFF EZ/AZ field

The other switches of S4 are used for the start address settings (refer to the following figure).

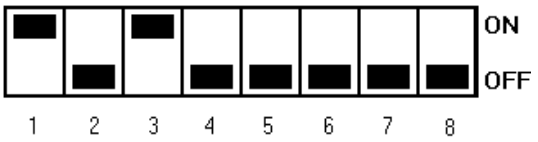
Valence:



Example: Coupling address: EZ/AZ·

Used: 0.0 - 5.7

Example: Coupling address: I/O 4



Used: 4.0 - 9.7

Baud rate	switches			
[Kbaud]	1	2	3	4
9.6	OFF	OFF	OFF	OF F
19.2	ON	OFF	OFF	OFF
93.75	OFF	ON	OFF	OFF
187.5	ON	ON	OFF	OFF
500	OF F	OFF	ON	OFF
1500	OFF	ON	ON	OFF

Set the desired transfer rate using DIL-switch S5. Thereby, the PCS 807 slave module is adjusted automatically.
All DIL-switches of S3 were set to OFF in the test setup.

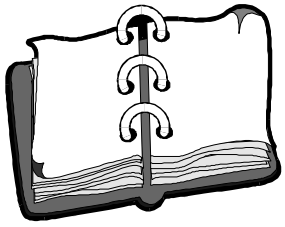
Remark!
With other boards used, possibly other settings are required for the master station address (refer to DESI-DP12). Please inform yourself using the corresponding manuals of the master board.

For the evaluation of the received data, the „PCS_KOMM" block is required that takes over the data traffic with the PCS DBs. Furthermore, an initialization (INIT)and an error block (COFF)is made available. You can use these blocks to define data word pre-assignments or emergency assignments. In addition, an example OB 1 is provided in which the block call is implemented. You find the files on the PCS 91.PDP floppy disk in the Profibus directory.

Remark!
In OB1, the first input word of the master coupling field must be copied to the first output word of the coupling field. This is required for the synchronization of CPU-DP master.

Parameters of the PCS_KOMM block:
The block requires 14 parameters. This makes it possible to freely select the addresses.
An example is provided in OB 1 (refer to the printout of the handling block).
The meaning of the parameters is as follows:

P0: PCS user DB. (PCS data 256 words)
P1: Start address of your selected Profibus input bytes
P2: Length of the selected Profibus input field minus 1 byte
P3: Start address of your selected Profibus output bytes
P4: Length of the selected Profibus output field minus 1 byte
P5: Restart input or flag. This is required to restart the communication after a communications fault. (Set the input to permanently high for an automatic reset)
P6: Timer for time-out monitoring
P7: timer time as constant
P8: Communication error output (the output is set to high level after a communications fault)
P9: PB of the „INIT" block
P10: PB of the „COFF" block
P11: Required flag (freely selectable, may not be used by other program parts)
P12: Required flag (freely selectable, may not be used by other program parts)
P13: Required flag (freely selectable, may not be used by other program parts)



C.1.2 Trouble-shooting

Programmable controller enters STOP mode

- The Stop commands in the handling software were not yet eliminated. Please eliminate these.
- Configuration of the master board is not compatible to the programmable controller. Please correct.

Programmable controller in RUN mode, „Send" LED" is OFF

- Errors in the network configuration
- Multibox not ready due to:
  - Wrong slave address. Check whether the master file matches the address.
  - In reset condition (DIL-switch 10 is set to ON). Set DIL 10 to OFF.
  - No supply voltage. Apply voltage to the Multibox.

Programmable controller in RUN mode, „Send" LED is ON, status message 01

- Programmable controller in Stop mode. Switch the programmable controller to RUN
- Network fault. Check whether all participants are configured correctly. Check the cabling.
- Coupling fault (CPU is not synchronized with master board). Check whether the start input word of the selected coupling field is cyclically copied to the start output word.

Programmable controller in RUN mode, „Send" LED is ON, no status message, PCS „Com" LED is ON

- Lauer handling block is not called in the programmable controller program. Please link in with correct parameters.
- A wrong driver was loaded into the PCS. Transfer the data record together with the correct driver again into the PCS operating console.

Programmable controller in RUN mode, „Send" LED is ON, no status message, PCS „Com" LED is OFF but later ON again

- The network configuration was not synchronized with all participants. Power down all involved units. Restart all units.
- The network setup is located in noisy environment. Provide for corresponding interference suppression.

Configuration examples:

➢ **PCS 900**

- Slave configuration: 16 bytes I-buffer and 32 bytes O-buffer
- AJ = 10
- The command words in the programmable controller are used as follows:
  W36 = KH0F60
  W37 = KH0001

The transfer of the time and the date is disabled and a message block is enabled for the transfer. Now, you will have an optimal communication for the key LED area of less than one second if you take provisions to display only a few variables.

➢ **PCS 095**

- Slave configuration: 12 bytes I-buffer and 24 bytes O-buffer
- AJ = 10
- The command word in the programmable controller is used as follows:
  W13 = KH0FC 1

Thus, the messages M0 ... 31 are enabled for the transfer. Now, you will have an optimal communication for the key LED area of less than 0.8 seconds if you take provisions to display only a few variables.

➢ **PCS 095**

- Slave configuration: 8 bytes I-buffer and 16 bytes O-buffer
- AJ = 1
- The command word in the programmable controller is used as follows:
  W13 = KH0FC 1

Thus, the messages M0 ... 31 are enabled for the transfer. Keys will be transferred quickly but the refreshing of the variable takes a longer time. The key LED time totals approx. 0.5 seconds. However, if you press a key only for a short time then the LEDs are read only when the key is released again. Thus, the LED will not light.

➢ **PCS 9000**

- Slave configuration: 24 input bytes and 32 output bytes
- AJ = 10
- The command word in the programmable controller is used as follows:
  W13 = KH 000C (CLK_D bit on pos. 2) (CLK_C bit on pos. 3)
  W16 = KH 0
  W17 = KH FF00

The transfer of the time and the date is disabled. Display no external variables in the status window as far as possible.

➢ **PCSS 590p/595p**

- Slave configuration: 16 bytes I-buffer and 32 bytes O-buffer
- AJ = 7
- The command word in the programmable controller is used as follows:
  W13=KH 0FC4
  W27 = 0

Thus the messages M0 ... M63 are enabled for the transfer. Now, you will have a communication time of less approx. 0.8 seconds for the key LED area if you take provisions to display only a few variables.

```
OB1   OB1              Master Baustein
PB0   PCS_KOMM    Expanderprogramm für PCS
PB2   INIT             Initialisierungsbaustein
PB3   COFF             Fehlerbaustein

   ;     OB1
   ; Filename:       OB1
   ; function:       Organisationsbaustein

   ;      p r o g r a m
   ;*********************************************************************
1    L    W  EZ64,A            ; copy the first word of your I/O-Area of the
2    T    W  A,AZ64            ; CPU - DESI-DP communication from input to
                               ; output

   ; call the Lauer communication subroutine PB (PCS_KOMM)

3    BA      -PCS_KOMM,14      ; call expander program
     P0   W  -DB1              ; DB  PCS-datafield of 256 words
     P1   W  &EZ10             ; W   startaddress of the Profibus-Input
     P2   W  K31D              ; K   lenght of input-bytes - 1
     P3   W  &AZ10             ; W   startaddress of the Profibus-Output
     P4   W  K31D              ; K   lenght of output-bytes - 1
     P5   B  -RESTART          ; B   restart input
     P6   W  -TIMER            ; T   watch dog PCS-communication
     P7   W  K4.2              ; K   timevalue for watch dog
     P8   B  M100.0            ; B   output-bit communication error
     P9   W  -INIT             ; PB  INIT (communication init PCS)
     P10  W  -COFF             ; PB  COFF (communication error PCS)
     P11  B  M100.2            ; B   for internal use
     P12  B  M100.3            ; B   for internal use
     P13  B  M100.4            ; B   for internal use

     ;U   B  M100.0            ; communication error to output
     ;=   B  A3.7

4    PE
     ;program end

     ;     PCSKOMM
     ;     expander-program for communication via Profibus with PCS-Topline
     ; Filename:       PCS_KOMM
     ; function:       expander for the CL400
     ;      D e c l a r a t i o n
     ; subroutine parameter:
     ;~~~~~~~~~~~~~~~~~~~~~~~~~
     ;BA      -PCS_KOMM,14      ; call expander program
     ;P0   W  -DB1              ; DB  PCS-datafield of 256 words
     ;P1   W  &EZ10             ; W   startaddress of the Profibus-Input
     ;P2   W  K31D              ; K   lenght of input-bytes - 1
     ;P3   W  &AZ10             ; W   startaddress of the Profibus-Output
     ;P4   W  K31D              ; K   lenght of output-bytes - 1
     ;P5   B  -RESTART          ; B   restart input
     ;P6   W  -TIMER            ; T   watch dog PCS-communication
     ;P7   W  K4.2              ; K   timevalue for watch dog
     ;P8   B  M100.0            ; B   output-bit communication error
     ;P9   W  -INIT             ; PB  INIT (communication init PCS)
     ;P10  W  -COFF             ; PB  COFF (communication error PCS)
     ;P11  B  M100.2            ; B   for internal use
     ;P12  B  M100.3            ; B   for internal use
     ;P13  B  M100.4            ; B   for internal use

     ;      p r o g r a m
```

```
     ;*****************************************************************************
     ;
     ; processor reset ⇒ reset BT9_KOM
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
     PZ:  1
1    U    B  -P_RI
2    O    B  -NEU_RI
3    SPB     -START_KO ; →
4    BX      -P0
     PZ:  2
5    U    B  -P12              ;second cycle to catch whole data (inputs)
6    SPB     -WAITDAT1
     PZ:  3
7    U    B  -P13
8    SPB     -WAITDAT2         ;second cycle to catch whole data (outputs)
; no process if timeout and restart input = 0
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
     PZ:  4
9    UN   B  -P5                       ; timeout ?
10   U    B  -P8                       ; restart ?
11   BEB
     ; instruction-number = 0 => wait for instruction-number =  0 ;
     ; if instruction-number = n => process received data
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
12   XO   W  B,B                      ; A Register = 0
13   L    W  -P1,A                    ; instruction-number = 0 ? Input
14   L    BY [A],A
15   VGL  BY A,B
16   SPZ     -NO_AUFTR ; →
17   BX      -P0                      ; open PCS-DB
     ; instructions-number > 0  ⇒  process the instructions
     ;
     ; Have the whole instruction received ?

18   L    BY DX3,B                    ; old instruction-number in byte 3
19   L    W  -P1,A                    ; load instruction-number (input)
20   L    BY [A],A
21   VGL  BY A,B                      ; compare old with new
22   SPZ     -NO_AUFTR                ; if even → no new instructions
23   L    W  -P1,A                    ; load address of receive inputs
24   L    BY [A],B                    ; load instruction-number 1. byte
25   ADD  W  -P2,A                    ;
26   L    BY [A],A                    ; load instruction-number last byte
27   VGL  BY A,B                      ; compare first with last
28   SPN     -NO_AUFTR                ; if not even → instructions are not
                                      ; complete
     PZ:  5
29   UN   B  -P11                     ;set wait-flag and wait one cycle
30   =    B  -P12
31   BE
          -WAITDAT1
     PZ:  6
32   U    B  -P11                     ;reset the wait-flag
33   =    B  -P12
34   L    W  -P1,A                    ; indir.address of datainputs
35   ADD  W  K1H,A                    ; at byte 2 load first instruction
36   L    W  -P3,B                    ; indir.address of dataoutputs
37   ADD  W  K1H,B
38   L    W  K2H,D                    ; reset receive counter
39   T    BY D,DX2                    ; DX2 = receive-counter

     ; analyse of the instructions

          -read_new    ; ←
40   L    BY [A],C                    ; read actual instruction
```

```
41   L    W  A,A
     ;SP     -AUFT_END

42   PUSH W  C
43   ADD  W  K1,A
44   L    BY [A],C
45   T    BY C,D
46   U    BY KF0H,C
47   VGL  BY K10H,C                    ; read instruction
48   SPZ     -READ     ; →
49   VGL  BY K20H,C                    ; write instruction
50   SPZ     -WRITE    ; →
51   VGL  BY K40H,C                    ; write and „AND“ instruction
52   SPZ     -WRITE_U  ; →
53   VGL  BY K80H,C                    ; write and „OR“ instruction
54   SPZ     -WRITE_O  ; →
55   POP  W  C
56   SP      -AUFT_END


    ;=========================================================================
     ; read instruction: copy data from PCS-datafield to send outputs
    ;=========================================================================
          -READ        ; ←
57   POP  W  C
58   PUSH W  A                        ; pointer receive inputs to stack

59   L    BY C,A                      ; load dataword address
60   U    W  K00FFH,A
61   SLL  W  A,1                      ; * 2
62  O   W  K1800H,A                   ; at to indirect address PCS-Datafield
63   L    BY D,C                      ; load instruction
64   U    BY K0FH,C                   ; mask count of datawords

          -return_r    ; ←           copy until count of datawords = 0
65   VGL  BY K0H,C
66   SPZ     -r_end                   ; read instruction end
67   INC  W  A,1
68   L    BY [A],D                    ; load high byte from PCS-datafield
69   T    BY D,[B]                    ; write to send outputs
70   DEC  W  A,1
71   INC  W  B,1                      ; increment send pointer
72   L    BY [A],D                    ; load low byte from PCS-datafield
73   T    BY D,[B]                    ; write to send-outputs
74   INC  W  B,1                      ; increment send pointer
75   INC  W  A,2                      ; increment datafield-address
76   DEC  BY C,1                      ; decrement dataword counter
77   SP      -return_r ; →

     ; is there another instruction ?
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
          -r_end
78   POP  W  A                        ; load from stack receive pointer
```

```
79   L    BY DX2,D                    ;
80   U    W  K00FFH,D
81   ADD  W  K2H,D                    ; increment receive pointer
82   VGL  W  -P2,D                    ; check if receive end
83   SPP     -AUFT_END
84   T    BY D,DX2
85   INC  W  A,1                      ; next instruction address
86   L    BY [A],D                    ;
87   VGL  BY K0H,D                    ; check if instruction = 0
88   SPZ     -AUFT_END
89   SP      -read_new ; →            ; there is another instruction
                                      ; → process the next instruction

     ;                                end read instruction
     ;=========================================================================
     ; write instruction: copy datawords from receive inputs to PCS-datafield
     ;=========================================================================
          -WRITE       ; ←
90   POP  W  C
91   PUSH W  B                        ; send pointer to the stack

92   L    W  C,B                      ; load PCS-dataword-address
93   U    W  K00FFH,B
94   SLL  W  B,1                      ; * 2
95   O    W  K1800H,B                 ; add to indirect address PCS-datafield
96   L    BY D,C                      ; load instruction
97   U    BY K0FH,C                   ; mask count of datawords
98   PUSH W  C                        ; dataword counter to the stack
99   INC  W  A,1                      ; increment receive pointer


          -return_w    ; ←            ; copy until dataword counter = 0
100  VGL  BY K0H,C
101  SPZ     -w_end                   ; write instruction end
102  INC  W  B,1                      ; receive address of high byte
103  L    BY [A],D                    ; load byte from receive inputs
104  T    BY D,[B]                    ; and store it as high byte
105  DEC  W  B,1                      ; receive address of low byte
106  INC  W  A,1                      ; increment datafield address
107  L    BY [A],D                    ; load byte from receive inputs
108  T    BY D,[B]                    ; and store it as low byte
109  INC  W  A,1                      ; increment datafield address
110  INC  W  B,2                      ; increment receive pointer
111  DEC  BY C,1                      ; decrement dataword counter
112  SP      -return_w ; ←

     ; is there another instruction ?
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
          -w_end
113  POP  W  C                        ; load from stack dataword counter
```

```
114  POP  W  B                          ; load from stack send pointer
115  INC  W  C,1                        ; count +1 instruction word
116  SLL  W  C,1                        ; count of byte
117  L    BY DX2,D
118  U    W  K00FFH,D
119  INC  W  D,[C]                      ; increment receive pointer
120  VGL  W  -P2,D                      ; check if receive end
121  SPP     -AUFT_END
122  T    BY D,DX2
123  L    BY [A],D                      ; load next instruction
124  VGL  BY K0H,D                      ; check if instruction = 0
125  SPZ     -AUFT_END ; →
126  SP      -read_new ; →              ; there is another instruction
                                        ; → process the next instruction
     ; end write instruction

    ; write and „AND“ instruction: that is an „AND“ function between received
    ; data and the data in the datafield, stored
    ; later in the datafield
    ;=============================================================================

          -WRITE_U
127  POP  W  C
128  PUSH W  B                          ; send pointer to the stack

129  L    W  C,B                        ; load PCS-dataword-address
130  U    W  K00FFH,B
131  SLL  W  B,1                        ; * 2
132  O    W  K1800H,B                 ; add to indirect address PCS-datafield
133  L    BY D,C                        ; load instruction
134  U    BY K0FH,C                     ; mask count of datawords
135  PUSH W  C                          ; dataword counter to the stack
136  INC  W  A,1                        ; increment receive pointer

          -return_u    ; ←            ; copy until dataword = 0
137  VGL  BY K0H,C
138  SPZ     -u_end                     ; write „AND“ instruction end
139  INC  W  B,1                        ; receive address of high byte
140  L    BY [A],D                      ; load high byte from receive inputs
141  U    BY [B],D                      ; „AND“ byte from PCS-datafield
142  T    BY D,[B]                      ; store it as high byte
143  DEC  W  B,1                        ; receive address of low byte
144  INC  W  A,1                        ; increment datafield address
145  L    BY [A],D                      ; load low byte from receive inputs
146  U    BY [B],D                      ; „AND“ byte from PCS-datafield
147  T    BY D,[B]                      ; store it as low byte
148  INC  W  A,1                        ; increment datafield address
149  INC  W  B,2                        ; increment receive pointer
150  DEC  BY C,1                        ; decrement dataword counter
151  SP      -return_u ; →

     ; is there another instruction ?
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
          -u_end
152  POP  W  C                          ; load from stack dataword counter
```

```
153  POP  W  B                          ; load from stack send pointer
154  INC  W  C,1                        ; count +1 instruction word
155  SLL  W  C,1                        ; count of byte
156  L    BY DX2,D
157  U    W  K00FFH,D
158  INC  W  D,[C]                      ; increment receive pointer
159  VGL  W  -P2,D                      ; check if receive end
160  SPP     -AUFT_END
161  T    BY D,DX2
162  L    BY [A],D                      ; load next instruction
163  VGL  BY K0H,D                      ; check if instruction = 0
164  SPZ     -AUFT_END ; →
165  SP      -read_new ; →              ; there is another instruction
                                        ; → process the next instruction

     ; end write „AND“ instruction

     ; write and „OR“ instruction: that is an „OR“ function between received
     ; data and the data in the datafield, stored
     ; later in the datafield

          -WRITE_O     ; ←
166  POP  W  C
167  PUSH W  B                          ; send pointer to the stack

168  L    W  C,B                        ; load PCS-dataword-address
169  U    W  K00FFH,B
170  SLL  W  B,1                        ; * 2
171  O    W  K1800H,B                  ; add to indirect address PCS-datafield
172  L    BY D,C                        ; load instruction
173  U    BY K0FH,C                     ; mask count of datawords
174  PUSH W  C                          ; dataword counter to the stack
175  INC  W  A,1                        ; increment receive pointer


          -return_o    ; ←            ; copy until dataword counter = 0
176  VGL  BY K0H,C
177  SPZ     -o_end                     ; write „OR“ instruction end
178  INC  W  B,1                        ; receive address of high byte
179  L    BY [A],D                      ; load byte from receive inputs
180  O    BY [B],D                      ; „OR“ byte from PCS-datafield
181  T    BY D,[B]                      ; and store it as high byte
182  DEC  W  B,1                        ; receive address of low byte
183  INC  W  A,1                        ; increment datafield-address
184  L    BY [A],D                      ; load byte from receive inputs
185  O    BY [B],D                      ; „OR“ byte from PCS-datafield
186  T    BY D,[B]                      ; and store it as low byte
187  INC  W  A,1                        ; increment datafield-address
188  INC  W  B,2                        ; increment receive pointer
189  DEC  BY C,1                        ; decrement dataword counter
190  SP      -return_o ; →

     ; is there another instruction ?
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
          -o_end
191  POP  W  C                          ; load from stack dataword counter
```

```
192  POP  W  B                        ; load from stack send pointer
193  INC  W  C,1                      ; count +1 instruction word
194  SLL  W  C,1                      ; count of byte
195  L    BY DX2,D
196  U    W  K00FFH,D
197  INC  W  D,[C]                    ; increment receive pointer
198  VGL  W  -P2,D                    ; check if receive end
199  SPP     -AUFT_END
200  T    BY D,DX2
201  L    BY [A],D                    ; load next instruction
202  VGL  BY K0H,D                    ; check if instruction = 0
203  SPZ     -AUFT_END ; →            ;
204  SP      -read_new ; →            ; there is another instruction
                                      ; process the next instruction

     ; end write „OR“ instruction

     ; AUFT_END: all instructions are done

          -AUFT_END    ; ←
     PZ:  7
205  UN   B  -P11                     ; wait one cycle to be sure that
206  =    B  -P13                     ; all outputs are refreshed

207  BE

     ; Invert instruction-number and write it to the first and last byte
     ; of the communication outputs
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
          -WAITDAT2
     PZ:  8
208  U    B  -P11                     ; reset wait-flag
209  =    B  -P13

210  L    W  -P1,A
211  L    BY [A],D                    ; load instruction-number
212  T    BY D,DX3                    ; store it in byte 3
213  XO   BY KFFH,D                   ; invert the instruction-number
214  L    W  -P3,A
215  T    BY D,[A]                    ; store it in the first and last
216  ADD  W  -P4,A                    ; output bytes
217  T    BY D,[A]


     ; watch dog
     ;~~~~~~~~~~~
     ; trigger time
     ;———————————————————
218  U    W  -P7,D                    ; timevalue
     PZ:  9
219  U    B  -LOG0
220  SE      D,-P6                    ;

     PZ:  10
221  U    B  -LOG1                    ; Watchdogmerker reset
222  R    B  -P8

223  BE              ; →
     ; end instructions

     ; no new instructions
          -NO_AUFTR                  ; ←
```

```
224  L    W  -P7,D                    ; timevalue
     PZ:  11
225  U    B  -LOG1
226  SE      D,-P6

     PZ:  12
227  U    B  -P6                      ; timeout ?
228  BEI

     ; set fault    watch dog has responsed
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
          -KOMM_FEL

229  S    B  -P8                      ; watch dog
230  XO   W  D,D

     ; init after communication error
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
231  BA      -P0                      ; open PCS-DB
232  BA      -P10                     ; COFF
233  BE               ; →
     ;                  end watch dog

     ; start of communication

          -START_KO
     ; start timer
     ;~~~~~~~~~~~~~~~~~~~~
234  L    W  -P7,D                    ; timervalue
     PZ:  13
235  U    B  -LOG0
236  SE      D,-P6

     ; reset fault
     ;~~~~~~~~~~~~~~~
     PZ:  14
237  U    B  -LOG1
238  R    B  -P8                      ; watch dog

239  XO   W  D,D

     ; init output at the first cycle
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
240  L    W  -P3,A
241  T    W  D,[A]

     ; init PCS-DB at first cycle
     ;~~~~~~~~~~~~~~~~~~~~~~~~~~~
     ;BA     P0                      ; open PCS-DB
     ;BA     P9                      ; INIT

242  BE               ; →
     ; end start communication

     ;program end

     ;** INIT: Subroutine INIT inits the PCS-datafield at the first cycle
     ;**       The user can program his own specifications
```

```
     ;HLT   ;!!!!! Here you have to specify your init values

     ;********************************** !!! at least set your
     ;**********************************     key-bytes to zero !!!!!


     ;***** Example PCS 009/090/095*****
     ;L   W  K0D,A
     ;T   W  A,D8
     ;T   W  A,D10
     ;T   W  A,D46
     ;L   W  K0FC8H,A
     ;T   W  A,D26                    ;CONTROLWORD A
     ;L   W  K0080H,A
     ;T   W  A,D28                    ;CONTROLWORD B

     ;***** EXAMPLE PCS 900/920/950 *****
     ;L   W  K0D,A
     ;T   W  A,D8
     ;T   W  A,D10
     ;T   W  A,D12
     ;T   W  A,D18
     ;T   W  A,D78                    ;CONTROLWORD D
     ;L   W  K0080H,A
     ;T   W  A,D76                    ;CONTROLWORD C
     ;L   W  K00FFH,A
     ;T   W  A,D74                    ;CONTROLWORD B
     ;L   W  K1F00H,A
     ;T   W  A,D72                    ;CONTROLWORD A

1    BE

      ;** COFF: subroutine COFF inits the PCS-datafield after communication
error
     ;**       ( emergancy case ) The user can program his own specifications


     ;HLT      ;!!!!! Here you have to specify your emergancy values
     ;**********************************
     ;**********************************
     ;**********************************         !!!!! CAUTION !!!!!
     ;**********************************   at least set the Key-bytes to zero
     ;**********************************

     ;***** Example PCS 009/090/095 *****
     ;L   W  K0D,A
     ;T   W  A,D8                     ; keys
     ;T   W  A,D10                    ; keys
     ;T   W  A,D46                    ; keys

     ;***** Example PCS 900/920/950 *****
     ;L   W  K0D,A
     ;T   W  A,D8                     ;keys
     ;T   W  A,D10                    ;
     ;T   W  A,D12

1    BE
```

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